

1                   **GLAZING PANEL INSTALLATION STRUCTURE AND METHOD**

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4                   Cross Reference to Related Applications

5                   This application claims the benefit of U.S. provisional Serial No. 60/404,666,  
6                   filed August 20, 2002.

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8                   Background of the Invention

9                   This invention concerns glazing installations and methods, particularly relating to  
10                  so called sacrificial glazing panels. These are readily replaceable protective glazing panels  
11                  typically used on buses to protect the primary glazing panel. The primary glazing panel is  
12                  usually formed of heavy tempered plate glass, and is sealed to prevent the entrance of water, dirt,  
13                  etc., so as to be expensive and difficult to replace.

14                  The primary glazing panel is subject to wear, abuse, and vandalism, and thus  
15                  thinner clear plastic "sacrificial" glazing panels have heretofore been installed, adjacent to or  
16                  spaced from the primary glazing panel. Such sacrificial panels are lower in cost to make and to  
17                  replace and thereby lower maintenance costs. The installation and removal of such glazing  
18                  panels has in the past required separate retainer parts and/or the use of special tools, such that  
19                  replacement still incurs a significant maintenance cost.

20                  It is the object of the present invention to provide a sacrificial glazing panel  
21                  installation structure and method which simplifies the replacement of such a panel.

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23                  Summary of the Invention

24                  The above recited object and others which will be understood upon a reading of

1       the specification and claims are achieved by providing a generally rectangular frame having a  
2       perimeter channel which is configured to receive a correspondingly configured thin plastic  
3       sacrificial glazing panel. The sacrificial glazing panel is sized relative to the frame perimeter  
4       channel such that upon being bowed to bring a pair of opposite edges together, another edge of  
5       the panel is able to be inserted into a receiving channel section. The perimeter channel is deeper  
6       in the receiving section to allow substantial vertical (or sideways) movement of the panel once  
7       the sacrificial glazing panel is inserted into the frame perimeter channel in order that an opposite  
8       glazing panel will clear the edge lip portion of the associated channel section. Allowing the  
9       glazing panel to lie completely within the frame.

10                  In one embodiment, resiliently compressible positioner elements are disposed in  
11       the bottom of the receiving channel section to reposition the installed sacrificial glazing panel so  
12       as to locate the inserted panel edge well within a retainer lip of the receiving channel section.  
13       Forcible downward movement of the sacrificial glazing panel inserted edge is accommodated by  
14       the compressible positioner element to enable the opposite edge to clear the lip portion of the  
15       opposite channel section and allow the panel to be completely received into the frame. Complete  
16       removal of the sacrificial panel is enabled upon a subsequent outward bowing thereof which  
17       draws the pair of opposite panel edges together sufficiently to clear the lip portions of an  
18       associated pair of channel sections, so that the panel can be tilted and lifted out of the frame.

19                  The resiliently compressible positioner elements preferably comprise wave  
20       springs engaging the lower edge of the sacrificial glazing panel, but may also can take other  
21       forms, such as compressible foam strips, compressible elastomeric seals or spring and slider  
22       assemblies.

1           In an alternative embodiment, removable plugs are inserted into the lip of a lower  
2       channel section comprising the deeper receiving channel section. The bottom edge of the  
3       sacrificial glazing panel rests on the plugs to be held elevated in the deeper bottom channel  
4       section so that the top edge is retained by the lip of the top channel section. Removal of the  
5       plugs allows the sacrificial glazing panel to be lowered sufficiently so that the upper edge clears  
6       the top channel section lip portion, in preparation for removal of the panel.

7           In another embodiment, the deeper channel section is in the top channel section to  
8       eliminate the need for positioner elements.

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10       Description of the Drawings

11           Figure 1 is a vertical sectional view of a window having upper and lower glazing  
12       assemblies each including a sacrificial glazing panel installation according to the invention.

13           Figure 2 is a front view of the window shown in Figure 1.

14           Figure 3 is a fragmentary view of a horizontal section taken through the window  
15       shown in Figure 2.

16           Figure 4 is a fragmentary sectional view of an alternate embodiment of the  
17       sacrificial glazing panel installation according to the invention.

18           Figure 5 is a fragmentary section view of a second alternate embodiment of the  
19       sacrificial glazing panel installation according to the invention.

20           Figure 6 is a fragmentary section view of a third alternate embodiment of the  
21       sacrificial glazing panel installation according to the invention.

22           Figure 7 is a fragmentary section view of a fourth alternate embodiment of the

1       sacrificial glazing panel installation according to the invention.

2                  Figure 8 is a view of the sacrificial glazing panel installation shown in Figure 7,  
3       but with the positioner plugs removed.

4                  Figure 9 is a front view of a window having sideways movable glazing panels  
5       incorporating the sacrificial glazing panel installation according to the invention.

6                  Figure 10 is a view of the section 10-10 taken in Figure 9.

7                  Figure 11 is a view of the section 11-11 taken in Figure 9.

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9       Detailed Description

10                 In the following detailed description, certain specific terminology will be  
11       employed for the sake of clarity and a particular embodiment described in accordance with the  
12       requirements of 35 USC 112, but it is to be understood that the same is not intended to be  
13       limiting and should not be so construed inasmuch as the invention is capable of taking many  
14       forms and variations within the scope of the appended claims.

15                 Referring to the drawings, and particularly Figures 1-3, a vehicle window 10 is  
16       depicted which includes an upper glazing assembly 12 and a lower glazing assembly 14 mounted  
17       in a vehicle body (not shown).

18                 A frame and seal assembly 18 mounts the window 10 in the vehicle body (not  
19       shown), which assembly does not form a part of the present invention and hence will not be here  
20       described in detail.

21                 Primary glazing panels 20A, 20B and associated seals are carried in a retainer  
22       frame comprised of retainer perimeter frame sections 24A and straight mullion frame sections

1        24B, each defining perimeter channels 26 receiving the primary glazing panels 20A, 20B. The  
2        primary glazing panels 20A, 20B are typically constructed of tempered glass, laminated glass or  
3        thick polycarbonate plastic.

4              The retainer frame sections 24A, 24B also mount generally rectangular sacrificial  
5        glazing panels 22A, 22B, each having top, bottom and side edges A, B, C, D, each edge received  
6        in an associated perimeter channel section defined by the respective retainer sections 24A and  
7        24B.

8              Upper channels 28A, 28B and lower channels 30A, 30B are formed in part by  
9        outer lip portions L which define a glazing opening smaller in size than the size of the sacrificial  
10       glazing panels 22A, 22B.

11             The mullion channel sections 30A, 30B are deeper than the perimeter channel  
12       sections 28A, 28B to create a vertical clearance for sliding movement of the sacrificial glazing  
13       panels 22A, 22B in the retainer frame during installation and removal thereof.

14             The upper mullion channel section 30A has a pair of curved double bowed leaf  
15       springs 32 installed in the bottom thereof which act to reposition the lower edge B of sacrificial  
16       glazing panel 22A of an intermediate position in the channel section 28 after downward pressure  
17       of the glazing panel 22A has been released, so that the top edge A of the panel is raised to again  
18       be located within the channel lip L and securely retained in the channel section 28A disposed  
19       thereabove.

20             The sacrificial glazing panels 22A, 22B are constructed of a relatively thin ( $\pm 1/8$   
21       inch) plastic, such as acrylic, of a greater size than the opening defined by the inside of the  
22       retaining lips L, but of a size such that when the center of the panel 22A, 22B is bowed, as with

1 the use of a pair of handled suction cups, the side edges C, D are drawn in to allow one edge to  
2 be inserted in a receiving channel section, i.e., channel section 30A or 30B.

3                   The top and bottom channel sections 28A, B are shallower than the opposing  
4 mullion channels 30A, 30B, so that when one edge of the sacrificial glazing panel 22A or 22B is  
5 first inserted and moved sufficiently towards the bottom of the respective channel 30A, 30B, the  
6 opposite edge clears the lip L of the respective channel section 28A, 28B, to allow the glazing  
7 panel 22A or 22B to be completely moved into the frame. Upon release, the side edges C, D of  
8 the sacrificial glazing panel 22A, 22B move apart to be received and retained in the associated  
9 side channels 34 (Figure 3) of the perimeter frame sections 24.

10                  To remove, the sacrificial glazing panel 22A is forcibly pressed downwardly,  
11 compressing double bowed leaf springs 32 moving the top edge A down sufficiently to clear the  
12 lip L of the associated channel section 28A. The sacrificial glazing panel 22A is bowed to draw  
13 together side edges C, D to clear the lip L of the side channels 34 and allow the sacrificial glazing  
14 panel 22A to be tilted and lifted out.

15                  The bottom edge B of the lower sacrificial glazing panel 22B is gravity biased  
16 down into the channel section 28B, and the panel 22B thus need only be lifted up until the  
17 bottom edge clears the associated channel section lip L and the panel 22A is then bowed to allow  
18 tilting out and removal. Thus, a positioner element is not necessary to retain of the top edge.

19                  Figure 4 shows an arrangement of compressible foam pieces 36 positioned  
20 engaging the lower edge B of the upper sacrificial glazing panel 22A to hold the same in the  
21 channel 28A.

22                  Figure 5 shows a compressible elastomeric element 38 which has a space 40

1 allowing downward movement when removing the sacrificial glazing panel 22A.

2                   Figure 6 shows a slide 42 and compression spring 44 engaging the underside of  
3 the slide 42 to urge the same up to position the upper edge of the sacrificial glazing panel 22A  
4 within the upper channel section 28A.

5                   Figures 7 and 8 show an arrangement comprised of a series of removable headed  
6 plugs 46 insertable in the lip L of the lower channel 30A, the plugs 46 each having a stem 50  
7 protruding through an opening 52 and into the channel 30A to hold the sacrificial gazing panel  
8 22A in an up position.

9                   Upon removal of the plugs 46, the sacrificial glazing panel 22A is lowered  
10 sufficiently to clear the lip L of the upper channel 28A, so that upon bowing of the panel 22A, it  
11 may be tilted out of removed as described above.

12                   The glazing panels may also be shifted sideways in the frame for removal.

13                   Figure 9-11 show a window 54 comprised of a pair of side by side glazing  
14 assemblies 56 and 58, each mounted in a frame and seal assembly 64. Each glazing assembly 56,  
15 58 includes a primary glazing panel 60A, 60B and sacrificial glazing panel 62A, 62B mounted in  
16 a retainer frame as in the above described embodiments.

17                   A curved corner generally rectangular perimeter frame section 66 and a straight  
18 divider frame section 68 respectively define sacrificial glazing panel receiving channel sections  
19 70A, 70B. The vertical divider channel sections 70B are deeper than the opposing perimeter  
20 channel sections 70A to allow horizontal shifting movement of the sacrificial glazing panel 62A,  
21 62B during installation and removal as described above, instead of the vertical movement  
22 described above.

1           The divider channel sections 70B each receive pairs of double bowed leaf springs  
2       72 disposed against the bottom wall thereof.

3           The springs 72 normally position one side edge of the sacrificial glazing panels  
4       62A, 62B so as to be retained by the lip L of the opposite section of the perimeter channel  
5       sections 70A in similar fashion to the above described embodiment.

6           Thus, the panels 62A, 62B can be shifted sideways by compressing the double  
7       bowed leaf springs 72 to allow the side edge E to clear the lip L. Upon bowing of the panel 62A,  
8       62B, the top and bottom edges are drawn together to clear the lip L of the top and bottom  
9       perimeter channel sections 70A to enable tilting out and removal of the panel 62A or 62B.

10      Installation is carried out in similar fashion.

11      Thus, a simple and quick installation or removal of sacrificial glazing panels can  
12     be carried out with a minimum use of tools.